Hot Particles in the Environment
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Introduction
Hot particles in the environment are a common occurrence. The presence of radionuclides in these particles causes special care in interpretation of IMS particulate samples and OSI samples.

There is ample data in the literature that describes hot particles in the environment. Several examples from nuclear accidents and nuclear tests are described, with similarities and contrasts highlighted.

Man-Made Explosion

Particles from the Kiwi Transient Nuclear Test (reactor explosion) Radionuclides in the Environment, Advances in Chemistry Series 93, pp.337-359; http://dx.doi.org/10.1021/ba-1970-0093.ch018

Chernobyl 1986

SEM image of a hot particle, J. Environ. Radioactivity 22 (1994) 127 139; http://dx.doi.org/10.1016/0265-931X(94)90018-3

Autoradiograph of hot particles from Chernobyl J. Environ. Radioactivity 52 (2001) 5-16; http://dx.doi.org/10.1016/S0265-931X(00)00081-3

Fukushima 2011

IMS RASA 3820110324, March 24, 2011 presented to RNEG WGB39, Nadalut, Greenwood

Photo and autoradiograph of hot particles from Fukushima, J Radioanal Nuc Chem [2013] 296:1079–1084; http://dx.doi.org/10.1007/s10967-012-2135-x

Nuclear Tests


Conclusion and Relevance to IMS and OSI
In addition to the radionuclide differences observed in hot particles from reactor accidents and nuclear tests, there are physical and radionuclide distribution differences in the hot particles.

Particulate sampling is designed to capture and measure these particles. However, as the activity is mostly located in these particles, it is highly likely that a non-homogeneous collection would be observed.

This has implications for sample splitting and duplicate sample analysis. Because of hot particles, duplicate samples and splits of samples will not be identical.